

LONG-RUN AND SHORT-RUN DYNAMICS OF FOREIGN RESERVES AND DOMESTIC CREDIT IN PAKISTAN

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Abstract

This study formulates and examines the monetary approach to the balance of payments by incorporating the currency substitution version of money demand function for Pakistan over the period 1962-2005 using FM-OLS and Johansen-Juselius cointegration techniques. The results suggest that real output, real exchange rate and domestic credit play an important role in the determination of foreign reserves in Pakistan in long-run as well in short-run. Moreover, the monetary authorities sterilize foreign exchange reserves by 12% in long-run and 34% in short-run. The results support the evidence of long-run causality running from foreign reserves to domestic credit. One important policy implication from the empirical analysis is that the validity of the monetary approach to the balance of payments and the effectiveness of monetary policy depend on the nature of the money demand function. As the specification of money demand function undergoes a change, the evidence for monetary approach has also alters.

JEL Codes: F40, F31, E50, C20

Key Words: Monetary Approach, Foreign Exchange Reserves, Domestic Credit, Cointegration

1. Introduction

The nature and effectiveness of the monetary policy depends upon the precise nature of the money supply mechanism. The knowledge and control over the domestic monetary variables is considered to be the pre-condition for developing an appropriate monetary policy. The literature suggests that balance of payments (BOP) is one of the very important issues to the policymakers in developing countries and is

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directly linked with the domestic excess demand for money. The literature on the monetary approach to the balance of payments (MABP) suggests that BOP is a monetary phenomenon and solely determined by the disequilibrium in the domestic money market. This does not mean that fiscal policy has no effect on the components of the BOP. Indeed, fiscal variables do affect BOP but through monetary channels and provide very important theoretical framework through which BOP can be analyzed.

The MABP postulates that in a small open economy the monetary equilibrium in the BOP can be achieved through the changes in monetary base. For example, if domestically created money supply exceeds its demand then this excess supply of money compel individuals to readjust their portfolios by purchasing goods, services and bonds to return to equilibrium. If the domestic residents demand foreign goods, services, bonds and foreign currencies to restore equilibrium, then foreign currency flows out of the country and thereby lowering the stock of money until the monetary equilibrium is re-established. Hence, one may conclude that the BOP is a monetary phenomenon. This hypothesis may provide an opportunity to examine how the monetary variables are determined. Thus, the MABP provides a convenient theoretical and empirical framework within which the monetary policy can be analyzed. The monetary approach has been tested for a number of developed and developing countries and the results have been mixed. Courchene (1973), De Granwe (1976), and Bilquees (1989) got the evidence which are inconsistent with the monetary approach, while Cos and Wilford (1977), Wilford and Zecher (1979), Bhattia (1982), Salam (1995), Khan (1996), Choudhary and Shabbir (2004) and Howard and Mamingi (2002) found results consistent with the monetary proposition. However, the studies conducted by Bean (1976), Connolly and Taylor (1976), Aghevli and Khan (1976), Uddin (1985) and Zecher (1976) found mixed results. All these studies have ignored the time series properties of the relevant variable. It is now well known that traditional ways of estimating time series model may suffer from spurious regression problem (Granger and Newbold, 1974).

The MABP serves as a useful analytical tool for policy purposes. The theory has continued to serve as the theoretical fulcrum for

stabilization programs sponsored by IMF in developing countries. The monetary approach clearly warns that expansionary monetary policy will lead to a depreciation of domestic currency and BOP deficit. Hence, for the correction of the BOP deficits, monetary restraint is required.

The main objective of this paper is to examine the implications of the MABP for Pakistan over the period 1962-2005. This paper makes two main contributions to the existing literature. *First*, since 1973 the literature has stressed the importance of including the exchange rate and foreign interest rate as determinants of money demand. Tower (1975), Arango and Nadiri¹, McNown and Wallace (1992), Bahmani-Oskooe and Rhee (1994), Bahmani-Oskooe (1996) and Bahmani-Oskooe and Techaratanachai (2001) have shown the existence of a relationship between money demand and exchange rates². Similarly, Arango and Nadori (1981) and Booth and Chawdhury (1992) have stressed the importance of foreign interest rates as a determinant of money demand because of its effects on the desired stock of real cash balances and exchange rate expectations. Therefore, we have formulated the MABP by using the currency substitution version of the money demand function to assess the impact of real exchange rate on the foreign reserves. *Second*, we apply Phillips-Hansen fully-modified OLS (FM-OLS) cointegration technique to estimate the BOP equation. This technique is more appropriate in tackling the problems of endogeneity and simultaneity.

The rest of the paper is organized as follows: section 2 deals with theoretical model, methodology and data. Interpretations of empirical

¹ They argued that a depreciation of the domestic currency increases the value of foreign securities held by domestic individuals. If this increase is perceived as an increase in wealth, the demand for domestic cash balances may increase. Further, when the exchange rate is expected to depreciate the expected return from holding foreign money increases and the demand for domestic currency falls (as individuals substitute foreign money for domestic currency).

² For example, Bahmani-Oskooe and Techaratanachai (2001) argued that the exchange rate in addition to income and interest rate is included as other determinant of money holdings.

results are discussed in section 3 while conclusions are drawn in section 4.

2. Theoretical Model of the MABP, Methodology and Data

The MABP represents a revival of price-specie-flow.³ The theory was originally advanced by David Hume (1752) and has been further extended by Mundell (1968), Johnson (1972a, 1972b, 1972c) and others⁴. In its original form, the monetary approach asserts that BOP is essentially a monetary phenomenon. The theory postulates that any disequilibrium in the BOP reflects a corresponding imbalance between domestic demand for and supply of money. A more detailed approach to the MABP is presented in the Annex.

There are two main components of the MABP: the demand for money and the supply of money process. Unlike the conventional money demand function, we specify the following money demand function in real term⁵.

$$(m - p)_t^d = a_0 + a_1 y_t + a_2 i_t + a_3 q_t + u_t \quad (1)$$

Where m , p , y and q are the logarithm of nominal money balances, price level, real income and real exchange rate respectively. i and u are the domestic interest rate and error term. According to equation (1), real money balances are assumed to be an increasing function of real income, that is, a_1 is expected to be positive. The opportunity cost of holding money relative to financial assets (i) is expected to yield a negative influence on money

³ Price-specie-flow mechanism means and increase in the stock of money causes the price level to rise. The increase in the price level diverts the demand abroad leading to a deficit in the trade balance. This trade deficit is financed through net money outflows, leading to a fall in the money stock and hence prices until international competitiveness is restored. As prices return to their original level, stock of money also returns to its original level.

⁴ See Frenkel and Johnson (1976) for collection of papers on different aspects of the monetary approach to the balance of payments.

⁵ Khan and Sajjid (2005) found that the empirical results rendered considerable support for this type of the specification of money demand function in the context of Pakistan.

demand, so a_2 is expected to be negative. Arango and Nadiri (1981) have argued that a depreciation of the domestic currency increases the value of foreign securities held by the domestic residents. If the domestic security holders perceive this increase as an increase in their wealth, their demand for domestic cash balances may increase. Thus an increase in the real exchange rate (i.e. depreciation of Pak-rupee) is likely to increase the demand for money. In this case a_3 is expected to be positive. On the other hand, when the exchange rate depreciates for a net debtor country like Pakistan, the Rupee value of wealth falls and this reduces the demand for money; hence the estimates of a_3 should be negative (Khan and Sajjid, 2005)⁶.

The second constituent of the MABP is the specification of the money supply process. In the open economy macroeconomic analysis money supply is equal to the sum of external component (foreign reserves) and internal component (domestic credit held by the central bank) of the monetary base. This can be written in real terms as (Otane and Sassanpour, 1988):

$$(m - p)_t^s = r_t + d_t \quad (2)$$

Where m , p , r and d are the logarithm of base money, price level, foreign reserves and domestic credit held by the central bank.⁷ From equation (2), we obtain $r_t = (m - p)_t^s - d_t$ which establishes the link between foreign reserves and domestic credit. Assuming monetary equilibrium where $(m - p)_t^d = (m - p)_t^s$, we have:

$$r_t = (m - p)_t^d - d_t \quad (3)$$

Substituting equation (1) in to equation (3) we get the following expression:

$$r_t = a_0 + a_1 y_t + a_2 i_t + a_3 q_t - d_t + u_t \quad (4)$$

⁶ The coefficient of the exchange rate can be positive or negative depending on the magnitude of the income and substitution effects resulting from a change in the exchange rate. However, we assume that the income effect dominates substitution effect.

⁷ These variables are expressed in real terms.

Re-writing equation (4) in the following estimatable form

$$r_t = \beta_0 + \beta_1 y_t + \beta_2 i_t + \beta_3 q_t - \beta_4 d_t + u_t \quad (5)$$
$$\beta_1 > 0, \beta_2 < 0, \beta_3 > 0, \beta_4 < 0$$

Equation (5) states that foreign reserves will be positive if demand for money exceeds domestic credit. However, if domestic credit exceeds money demand, then foreign reserves is expected to be negative. In other words, an autonomous increase in domestic credit in excess of demand for money balances results in an outflow of reserves while an excess of money demand results in an inflow of reserves (Alawode, 1997).⁸

The monetary authorities of Pakistan have taken various policy measures to improve the BOP position, to stabilize the external and internal value of domestic currency and to increase the foreign exchange earnings by accelerating exports. These measures among other include the shifts of exchange rate regime and devaluation of Pak-rupee. Before 1972, the Pak-rupee was pegged with Pound Sterling. The Pak-rupee was delinked from Pound Sterling and was pegged with US-dollar during the early 1970s. Between December 1980 and December 1981 Pak-rupee appreciated substantially against other currencies of the world as it followed the appreciation of US-dollar⁹. This revaluation of Pak-rupee brought adverse effects on the Pakistani exports to non-dollar area. Consequently, in 1982 a major shift occurred in Pakistan's exchange rate policy. Pak-rupee was delinked from the US-dollar and pegged to a basket of currencies of major trading partners. However, US-dollar remained an anchor currency and rupee/dollar parity has to be fixed by the State Bank of Pakistan (SBP) on daily basis. In July 2000, the exchange rate policy has been shifted from managed float to free flexible exchange rate. Besides, the government also took various measures to liberalize trade and financial sectors since 1990. To

⁸ We express all the variables in real terms except interest rate.

⁹ For example, the Pak-rupee was appreciated against the pound sterling by 22.9%, and by 25.12% against French Franc. In overall term the nominal trade weighted appreciation of Pak-rupee was 7.94% against ten international currencies (Ahmed, 1992; Khan, 1996)

capture the impacts of these structural changes, we apply CHOW break point test for the period 1972, 1982 and 2000 to examine the structural stability of the model.

To examine the short-run movements in foreign reserves, we specify the following short-run dynamic model:

$$\Delta r_t = \alpha_0 + \sum_{i=0}^{k-1} \beta_{1i} \Delta r_{t-i} + \sum_{i=0}^{k-1} \beta_{2i} \Delta y_{t-i} + \sum_{i=0}^{k-1} \beta_{3i} \Delta i_{t-i} + \sum_{i=0}^{k-1} \beta_{4i} \Delta q_{t-i} + \sum_{i=0}^{k-1} \beta_{5i} \Delta d_{t-i} + \lambda EC_{t-1} + \xi_t \quad (6)$$

Where Δ is the first difference of the variables, λ is the speed of adjustment towards the long-run equilibrium, EC_{t-1} is the lagged error-correction and ξ is the error term.

Aghevli and Khan (1977, p. 280) postulate that:

An increase in the growth rate of real income will improve the balance of payments, while increase in the rate of growth in interest rate and net domestic assets of the central bank will lead to reserve losses.

Moreover, change in real exchange rate is expected to increase the money demand, which in turn, boosts the foreign reserves.

The present study is based on annual data covering the period from 1962 through 2005. The data on foreign reserves (r) included gold and is defined as domestic currency over CPI. Domestic credit (d) is calculated as the sum of central bank credit to the government and to the financial system divided by CPI. Interbank call money rate (i) is used as an opportunity cost of holding money. Real GDP (y) is calculated as nominal GDP divided by CPI. The data on r , d , i and y are taken from *Handbook of Statistics on Pakistan Economy 2005* published by SBP¹⁰. Real exchange rate is calculated as $q_t = (s_t + p^* - p)$ where s is the annual average nominal exchange rate and $p^*(p)$ are respectively the US wholesale price

¹⁰ http://www.sbp.org.pk/departments/stats/pakEconomy_HandBook/Index.htm

index (Pak-consumer price index).¹¹ Data on these variables are taken from *International Financial Statistics* CD-ROM (2006). Except interest rate all other series are expressed in logarithmic form.

To examine the long-run relationship between foreign reserves and domestic credit specified in equation (5) one can apply static ordinary least squares (OLS) method suggested by Engle and Granger (1987). However, this method suffers from two main problems. First, in case of small sample size the bias in the simple OLS estimator of the cointegrating vector may still be large due to the exclusion of the short-run dynamics (Banerjee *et al.*, 1986). Given the small sample size in our case, this problem is not negligible. Second, could be that the MABP also suffers from the problems of endogeneity and simultaneity because of the interdependence of foreign reserves and domestic credit. Lasker (1982) and Fry *et al.* (1980) have pointed out that the OLS estimation of the off-set coefficient in the reduced from reserve flows equation is biased because of the endogeneity of the domestic credit component of the money supply. If central bank varies domestic credit in response to the balance of payments position, this would create a simultaneous relationship between the domestic credit and foreign reserves. To overcome these problems we choose Phillips and Hansen (1990) Fully-modified OLS procedure over Johansen and Juselius (1990) cointegration technique to correct for serial correlation, endogeneity and possible simultaneity effects.

Hargreaves (1994) has also pointed out that Johansen-Juselius cointegration technique has been found to be very sensitive to lags in the specified error-correction model. However, in case of small sample, Fully-modified OLS (FM-OLS) cointegration technique is more appropriate and efficient in estimating long-run economic equilibrium relationships.

3. Empirical Results

Before the implementation of FM-OLS cointegration procedure, we first examine that whether all the series are I (1) or

¹¹ Both Producer Price Index and Consumer Price Index are (2000=100) as base. We have used Edwards's (1989) methodology to calculate real exchange rate.

not. The order of integration is determined using Augmented Dickey Fuller (ADF) unit root test. Table 1, in the Annex, report the results of ADF test. The results reported in Table 1 suggest that all the series are nonstationary at their log-level and stationary at their log-first difference. Thus we implement FM-OLS approach to estimate equation (5).

3.1. Robustness of the Results. The estimates obtained from Phillips-Hansen single-equation procedure is much sensitive to the method of estimation. To ensure that the conclusions are fully coherent with the data, we implement Johansen and Juselius (1990) multivariate cointegration test. The results are reported in table 2 in the Annex.

The long-run cointegrating relationship based on FM-OLS is obtained by selecting lag length of order 2 based on Bartlett window.¹² For obtaining the FM-OLS cointegrating estimators, Bartlett window lags are necessary for containing the long-run variance matrix (Phillips and Hansen, 1990). The long-run estimates of Phillips-Hansen procedure assuming that none of the variables has a drift and Bartlett weights with two lags are given by:

$$\begin{aligned} r_t &= -5.26 + 1.62 y_t - 0.02 i_t + 1.37 q_t - 1.12 d_t \\ t - stat & \quad (-5.36) \quad (5.31) \quad (-0.72) \quad (3.21) \quad (-4.07) \quad (7) \\ ADF &= 4.17^{**} \end{aligned}$$

ADF test of cointegration applied on the residuals generated from the estimated equation (7) is significant at the 5% level, which implies a rejection of the null hypothesis of no long-run relationship between foreign reserves and its determinants. The estimated results indicate that except the nominal interest rate, real GDP, real exchange rate and real domestic assets of the SBP significantly affect the real value of foreign reserves inflow. The coefficient of domestic credit is equal to -1.12, which implies that an increases in the domestic assets induces by capital outflow by about 1.12 percent in the long-run. This result implies that the monetary policy is weak in

¹² The reason for picking 2 lags is that we have only 44 observations. Hakkio and Rush (1991) has pointed out that the ability of cointegration test to detect cointegration depends on total sample length rather than the frequency of data.

controlling money supply in the long-run. Besides, it is assumed that domestic credit is exogenous and foreign reserves will be lower when the domestic credit is large. This confirms the negative relationship between the domestic credit expansion and the foreign reserves. The magnitude of domestic credit is relatively large in the long-run. This could be due to the relaxation of capital controls and reforms in the exchange and payments system.

The coefficient of real GDP is positive and significant; this implies that an increase in domestic output increases domestic money demand, which in turn, appreciates Pak-rupee. An appreciation of Pak-rupee increases foreign reserves through the increases in exports. The increase in interest rate impacts foreign reserves negatively through money demand channel. However, this variable remains insignificant in the long-run.

For the application of Johansen-Juselius cointegration test we select 2 lags based on the Likelihood ratio test adjusted for degrees of freedom and AIC. Maximum eigenvalue ($\lambda - \max$) and Trace ($\lambda - \text{trace}$) statistics are used to examine the cointegration between foreign reserves, real GDP, interest rate, real exchange rate and domestic credit. Both $\lambda - \max$ and $\lambda - \text{trace}$ statistics supports the existence cointegration with a single cointegrating vector. The estimated cointegrating relationship and standard errors are given in equation (8):

$$\begin{array}{rcccccc} r_t & = & -7.49 & + & 1.55 & y_t & - & 0.02 & i_t & + & 1.33 & q_t & - & 0.98 & d_t \\ S.E & & (1.80) & & (0.61) & & (0.04) & & (0.84) & & (0.50) & & & & (8) \end{array}$$

Likelihood Subject to Exactly Identifying Restrictions = 65.94

The adjustment coefficients for each equation are given by: [#]

$$\begin{array}{rcccl} \Delta r_t & = & -0.09 & \Delta y_t & = & -0.04 & \Delta i_t & = & -0.12 \\ & & (-1.08) & & & (-7.42)^* & & & (-0.38) \\ \Delta q_t & = & -0.04 & \Delta d_t & = & 0.03 \\ & & (-1.35) & & & (0.90) \end{array}$$

It is clear from the Johansen-Juselius cointegration test that the signs and the statistical significance of the coefficients were very

[#] Numbers in brackets indicate t-values

close to those obtained from the Phillips-Hansen procedure. Therefore, the conclusions are not affected by the method of estimation. The adjustment coefficients suggest that the disequilibrium in the BOP (movements in foreign reserves) is corrected only through the changes in real GDP. The insignificance of adjustment coefficients associated to interest rate, real exchange rate and domestic credit confirm the weak exogeneity of these variables. These results are consistent with the fact that like many other developing countries, interest rate, exchange rate and domestic credit in Pakistan as well is determined outside that system and mostly based on the discretions of the fiscal authorities.

The empirical investigation of the short-run dynamics is very crucial for policy analysis. The short-run behaviour of foreign reserves and domestic credit can be judged through the estimation of short-run dynamics. Hence, we construct an error-correction model to examine the short-run responses of the foreign reserves (r_t) in relation to its explanatory variables (i.e. y_t, i_t, q_t and d_t). The dynamic model is estimated using OLS method and error-correction term is extracted by using the estimates given in equation (7). The results are given by equation (9):

$$\Delta r_t = 1.53\Delta y_t - 0.10\Delta i_t + 1.03\Delta q_t - 0.34\Delta d_t - 0.46E\hat{c}_{t-1} \quad (9)$$

$$t-stat \quad (2.01) \quad (-4.77) \quad (8.60) \quad (-2.42) \quad (-4.20)$$

$$\bar{R}^2_{adj} = 0.50, \quad SC- \chi^2(2) = 0.58, \quad RESET- \chi^2(1) = 1.05,^{13}$$

$$NO- \chi^2(2) = 0.05, \quad Het- \chi^2(1) = 0.05: \text{ Chow Break points:}$$

1972- $F-stat = 2.73$; 1982- $F-stat = 3.13$; 2000- $F-stat = 1.93$
To examine the long-run causality between foreign reserves and domestic credit, we estimate the following monetary authority's reaction function:

¹³ SC, for serial correlation, RESET test for functional form, NO for normality and Het. for heteroscedasticity. All tests are distributed as χ^2 distribution

$$\Delta d_t = 1.60\Delta y_t + 0.03\Delta i_t - 0.05\Delta i_{t-2} + 0.22\Delta q_t - 0.19\Delta r_{t-1} - 0.12Ec_{t-1} - 0.17D_{00} \quad (3.47)$$

(2.00) (-2.59) (1.25) (-2.47) (-1.50) (2.15)

(10)

$$\bar{R}^2_{adj} = 0.27, \quad SC-\chi^2(1) = 0.19, \quad RESET-\chi^2(1) = 15.8517, \\ NO-\chi^2(2) = 73.72, \quad Het-\chi^2(1) = 0.2740^{14}$$

These results presented in equation (9) suggest that all the coefficients are statistically significant and correctly signed. Estimated equation passes all the diagnostic checks. For structural break, we implement Chow Break Point test for 1972, 1982 and 2000 and do not find any structural break over the period of study. These results are verified by CUSUM and CUSUMSQ stability tests (Figures 1a and 1b in the Annex).

The results reported in equation (10) show that apart from the coefficients of real exchange rate depreciation and lagged error-correction term all other variables are statistically significant. The dummy variable D00¹⁵ is used to capture the changes in exchange rate regime in 2000 (from managed float to free float) show significant negative impact on growth of domestic credit.

The results reported in equation (9) suggest that real income growth exerts positive influence on foreign reserve flows in the short-run. This implies that an increase in the real income leads inflows of foreign reserves. However, the coefficient of the real output growth (1.53) does not support the assumption of homogeneity. The coefficient of interest rate growth is negative and significant; suggesting that an increase in domestic interest rate will cause outflow of foreign exchange reserves.

The coefficient of real exchange rate depreciation is positive and significant; indicating that as the real exchange rate depreciated domestic residents perceives that their wealth increases. This leads to

¹⁵ The dummy variables D72 for East Pakistan separation, D82 for managed float and D00 for free float are included in all the equation. However, these dummies become insignificant and only D00 remained significant in equation (10). Therefore, we left out all the insignificant dummies from the analysis.

increase in demand for real cash balances which cause foreign reserves inflow. Finally, the coefficient of domestic credit growth is negative and significant and is equal to -0.34 which implies that an increase in domestic credit leads to outflow foreign reserves by about 0.34 percent. This result contradicts the earlier findings (e.g. Khan, 1996 and Chaudhary and Shabbir, 2004). This could be due to the change in the specification of the money demand function which is the main building block of the MABP. Tsaing (1977) argue that the “lack of clear-cut specification is worrying and the casual way in which one specification is picked in reference to another does not inspire much confidence in the model”. The other reason may be the use of different estimation technique.

In the context of Pakistan, Uddin (1985), Bilquees (1989) and Chaudhary and Shabbir (2004) have used the traditional money demand function that depends on real income, interest rate and inflation rate to derive the reserve flows equation. However, the present based on the money demand function that incorporates real exchange rate as an additional argument. Due to the change in money demand specification our results are significantly different from the studies referred above. This implies that the validity of the MABP and the effectiveness of the monetary policy depend on the nature of the money demand function

The error-correction coefficient is negative and significant suggesting that about 46 percent of the disequilibrium is eliminated within a year. To determine the long-run causality between foreign reserves and domestic credit, we have estimated dynamic model for monetary policy reaction function (equation, 10). The coefficient of the error-correction term is equal to -0.17 and statistically insignificant. The insignificance of the error-correction term rejects the possibility of two-way causality running from foreign reserves to domestic credit. Hence, the results of the study support the evidence of one-way long-run causality running from domestic credit to foreign reserves. Finally, the evidence suggest that in short-run foreign reserves respond negatively to short-run changes in interest rate and domestic credit, while output growth and real exchange rate depreciation promotes growth in foreign reserves.

4. Conclusions and Policy implications

In this study an attempt has been made to reformulate and estimate the MABP for Pakistan over the period 1962-2005 utilizing FM-OLS and Johansen-Juselius (1990) cointegration techniques. Both long-run and short-run versions of the MABP have been tested. The results suggest that in long-run real output and real exchange rate exerts positive influence on foreign reserves. However, the impact of exchange rate is larger than that of real output. The impact of domestic monetary policy instruments (i.e. interest rate and domestic credit) on foreign reserves is negative. The sign of the domestic interest rate is negative but statistically insignificant, while domestic credit variable exerts negative and significant impact on the level of foreign reserves. The results further suggest that in long-run the degree of sterilization is 12 percent.¹⁶

However, in the short-run all variables are significant and possess correct signs. In the short-run output growth and exchange rate depreciation exerts positive impact on the foreign reserves movements, while interest rate changes and domestic credit growth exerts negative impact on foreign reserves. The off-set coefficient is equal to -0.34 in the short-run, which implies that the degree of sterilization is 34 percent. The error-correction term possesses expected negative sign and statistically significant, suggesting that about 46% of the previous period's deviations is eliminated in the current period. Moreover, the domestic credit and interest rate are weakly exogenous. The estimated reserve-flow equation remains stable as indicated by the Chow break point and CUSUM and CUSUMSQ stability tests. The results support the evidence of one-way causality running from foreign reserves to domestic credit. Important policy implications derived from the above analysis include: (i) the validity of the MABP depends on the nature of the money demand function. Whenever, the specification of money demand function changes the signs and size of parameters of the variables included in the reserve flows equation will also changes. (ii) Inverse relationship between foreign reserves and domestic credit suggest that the authorities may restrict the borrowings from the SBP

¹⁶ In the long-run the degree of sterilization is equal to $1 - 1.12 = -0.12$

because excessive borrowings cause significant loss of foreign reserves.

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Annex

MABP

Unlike “elasticities” and “absorption” approaches, the MABP treat BOP as monetary problems and should be tackled by explicitly investigating the domestic monetary behaviour (Alawode, 1997). The proponents of the monetary approach contend that beside the monetary factors, real factors do affect BOP through monetary channels. Valinezhad (1992) argues that the MABP only asserts that the effect on the BOP of a high rate of economic growth should be analyzed with the tools of monetary theory. Talking about the monetary approach to the balance of payments, Johnson (1976a) said:

The central point of the monetary approach to balance-of-payments policy theory is that balance-of-payments deficits or surpluses reflect stock disequilibrium between money demand and supply in the market for money.

Johnson (1977a) further said that:

A balance of payments deficit or surplus represents a transient stock-adjustment process evoked by initial inequality between actual; and desired money stocks.

The monetary approach maintains that the BOP are essentially a monetary phenomenon and the root cause in the payments imbalances are the disequilibrium between the demand for and supply of money. This proposition is often called strong version of the monetary approach (Rabin and Yeager, 1982).

One of the major conclusions of the MABP analysis is that the exchange flexibility is unnecessary and that BOP disequilibrium can only be corrected by policies that rectify the disequilibrium in the domestic money markets. In any event BOP imbalance is said to be self-limiting (Kreinin and Officer, 1978).

The monetary approach diverges from other models of the BOP adjustment in two ways. *First*, it gives a simultaneous analysis of both current and capital accounts by focusing the attention on the official reserves account of the BOP. Hence, MABP obtain a vantage

view of overall BOP movements unlike traditional models which dealt either with the current account or capital account in isolation.

The *second* divergence of the MABP is the utilization of monetary analysis and portfolio choice theory in its explanation of BOP disequilibria and adjustment. The MABP argues that any disequilibrium in the BOP mirrors an imbalance in the domestic money market and the traditional tools of analyzing demand for and supply of money are directly relevant to the analysis of BOP movements.

The MABP particularly stresses following three points (Johnson, 1977a):

- Balance of payments problems are monetary problems in a world monetary economic system and should be analyzed by models that explicitly specify monetary behaviour and integrate it with the real economy, rather than by models that concentrate on real relationships and treat monetary behaviour as a residual of real behaviour.
- Money is a stock, not a flow, and monetary equilibrium and disequilibrium require analysis of stock equilibrium conditions and stock adjustment processes.
- It is essential for balance of payment analysis to recognize that, although money can be obtained from two alternative sources—the expansion of domestic credit and the exchange of goods or assets for international money and conversion of international into domestic money via the monetary authority—only the second affects the balance of payments.

Thus the monetary approach views the BOP as a purely monetary phenomenon, with money playing a fundamental role in its determination.

Like other approaches, the MABP too suffers from a number of shortcomings (Alawode, 1997). *Firstly*, the existence of a stable money demand function is the cornerstone of the MABP. However, there is no general consensus about the precise specification of the

money demand function¹⁷ and no justification is provided for selected specification. Boughton (1988) has pointed out that there is ample evidence that money demand functions are highly unstable, economies are rarely at full employment, and purchasing power parity is useless as a guide to exchange rate movements. Although these assumptions holds reasonably well in the long-run, but are very rarely fulfilled in the short-run. The empirical violation of these assumptions brings open questions regarding the policy relevance of the monetary approach. However, Akhtar (1978) argued that for the MABP, stability of money demand is important rather than the nature of the specification. *Secondly*, extensive financial liberalization in many countries implies that multiple currencies are freely held by individuals within the same region (Connolly 1978). If foreign currencies are more stable than domestic currency then individuals substitute domestic currency for foreign currencies. The exchange rate therefore becomes a more relevant argument in the money demand function and the greater the substitution between domestic and foreign currencies, the less stable will be the exchange rate and the money demand function (Alawode, 1997). *Thirdly*, the MABP assumes instantaneous adjustment of portfolios when money market equilibrium is disturbed. This assumption ignores the fact that there are lags in the adjustment process and it takes time for excess balances to dissipate. If portfolio adjustment is not instantaneous, the linkage between domestic credit and BOP disappeared and a key relationship in the structure of MABP collapses. Therefore, the speed of adjustment is a vital determinant of whether credit policy can correct BOP deficits as MABP predicts¹⁸.

However, regarding the misinterpretation of the MABP, Frenkel and Johnson (1976, p. 24) stated that:

The monetary approach to the balance of payments asserts neither that monetary mismanagement is the only cause nor that monetary change is the only possible cure, for balance of payments problems; however, that monetary processes will bring about a cure of some

¹⁷ Both income and wealth are often used alternatively as scale variable in the money demand specification and sometimes price variable appears as an additional argument in the specification.

¹⁸ Ibid, p. 18

kind—not necessarily very attractive—unless frustrated by deliberate monetary policy action, and that policies that neglect or aggravate the monetary implications of deficits and surpluses will not be useful in their declared objectives.

It is argued that the policy proposition of the MABP can only be hold if the change in money demand is independent of the rate of change of domestic credit. This is possible only in the long run. However, in the short run, it is unlikely that nominal income and interest rate will be unaffected by the change in domestic credit. Furthermore, BOP is unlikely to be a monetary phenomenon if domestic credit is not exogenous and can be affected by non-monetary forces such as tariffs. If stock-flow equilibrium is to be restored after a change in a real variable, the domestic credit must necessarily be changed, implying that domestic credit is endogenous and is determined by real factors in the long run. Therefore, domestic credit may not be a useful policy variable. In this case real analysis of the BOP might be preferable to a monetary one (Currie, 1976).

Despite the various shortcoming outlined above, the MABP remains a useful analytical tool for policy purposes. The MABP has continued to serve as the theoretical fulcrum for IMF-sponsored stabilization programmers in developing countries. For example, the monetary approach clearly warns that policy of excessively expansionary monetary policy will lead to a depreciation of domestic currency and BOP deficit via an outflow of international reserves. Hence, for the correction of the BOP deficits, monetary restrain is required.

The MABP contain no clear-cut specification of the dynamics of adjustment to disequilibrium. It simply relates the BOP to changes in money demand and domestic credit, which is the outcome of an adjustment process, but does not describe the channels, through which a disturbance to equilibrium is eliminated (IMF, 1987). Hence, due to the lack of a clear-cut adjustment mechanism, a substantial degree of confidence in the MABP is impossible.

Tables

Table 1: Unit Root Test

Series	Log-level	Log-difference	Decision
r_t	-0.7971 (0)	-4.8240 (6)**	I (1)
y_t	-0.4598 (0)	-6.8010 (0)**	I (1)
i_t	-2.1629 (4)	-7.1889 (0)**	I (1)
q_t	-0.9771 (0)	-7.9138 (0)**	I (1)
d_t	-1.7500 (2)	-5.2712 (1)**	I (1)

Table 2: Johansen-Juselius Cointegration Test

Series: $[r_t, y_t, i_t, q_t, d_t]$ and Lag = 2

ρ	Eigen values	$n - \rho$	λ max	95%	λ trace	95%	AIC	M-LL
$\rho = 0$	0.69	5	50.77*	34.40	96.81*	75.98	15.55	40.55
$\rho \leq 1$	0.35	4	18.62	28.27	46.04	53.48	30.94	65.94
$\rho \leq 2$	0.32	3	16.31	22.04	27.42	34.87	32.25	75.25
$\rho \leq 3$	0.16	2	7.57	15.87	11.11	20.18	34.42	83.41
$\rho \leq 4$	0.08	1	3.53	9.16	3.53	9.16	34.19	87.19

Note: M-LL = Maximized Log-likelihood ratio. * indicate significant at the 5% level.

Figures

Figure 1a: CUSUM and CUSUMSQ Stability Tests of Equation (9)

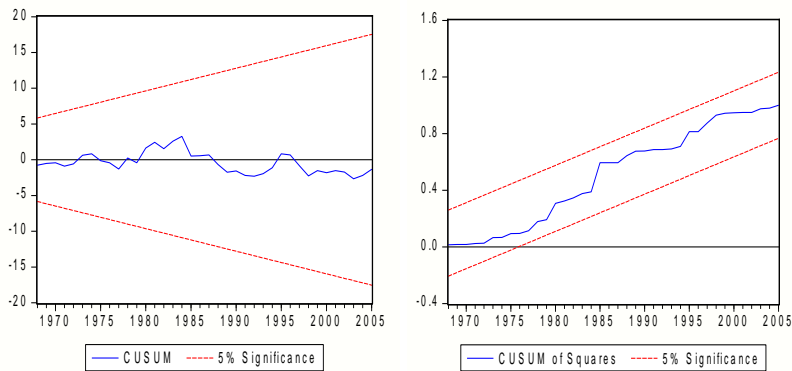


Figure 1b: CUSUM and CUSUMSQ Stability Tests of Equation (10)

